

Urgent Intracranial Angioplasty after Combined Systemic and Intra-Arterial Thrombolysis in Acute Stroke

An Initial Experience in Indonesia

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Summary

We report a case of a 59-year-old man who presented with an acute stroke involving the territory of his left middle cerebral artery, and who was treated with combined systemic and intra-arterial thrombolysis. After these treatments, the segment remained stenotic. An urgent intracranial angioplasty was performed, resulting in satisfactory recanalization of the stenotic segment, and significant improvement of his National Institutes of Health Stroke Scale (NIHSS) from 14 to 5. This case report suggests an effective alternate protocol for treatment of acute stroke with arterial occlusion: immediate smaller dose of IV tissue plasminogen activator (tPA), followed by angiogram, intra-arterial thrombolysis, and angioplasty if indicated.

Introduction

The effectiveness of intra-arterial thrombolytic therapy for acute middle cerebral artery (MCA) occlusion has been demonstrated by a recent randomized controlled trial¹. However, the drawbacks of this therapy include an increased incidence of serious hemorrhagic complications¹⁻³ and failure to achieve arterial recanalization in approximately one third of patients¹. Because of these limitations, there has been increasing interest in the use intracranial angioplasty as an adjuvant or alternative to

thrombolytic therapy^{4,6}. We present a patient who underwent intracranial angioplasty in the M1 segment of the left MCA after delivery of combined systemic and intra-arterial thrombolysis. We believe this was the first experience in Indonesia of successful arterial recanalization.

Case Report

A 59-year-old man with a history of diabetes mellitus, hypertension, and hyperlipidemia had sudden onset of right hemiplegia. His National Institutes of Health Stroke Scale (NIHSS) score was 14. Laboratory evaluation and an urgent CT of the brain were unremarkable, and he was treated with 50 cc intravenous tPA 2.5 hours after the onset of symptoms. Our general protocol for intra venous thrombolysis is 0.9 mg of tPA per kg body mass (the patient was 70 kg); however, because the available supply of tPA had been depleted, we decided to continue with intra-arterial thrombolysis.

Cerebral arteriography revealed approximately 95% stenosis at the M1 segment of the left MCA (Figure 1A) 4.5 hours after the onset of symptoms, and two hours after administration of systemic tPA. Intra-arterial thrombolysis using Streptokinase (total dose of 100,000 IU) was then delivered over two hours. At the end of thrombolysis, the stenosis persisted, and the artery had failed to recanalize. We decided to perform urgent intracranial angioplasty.

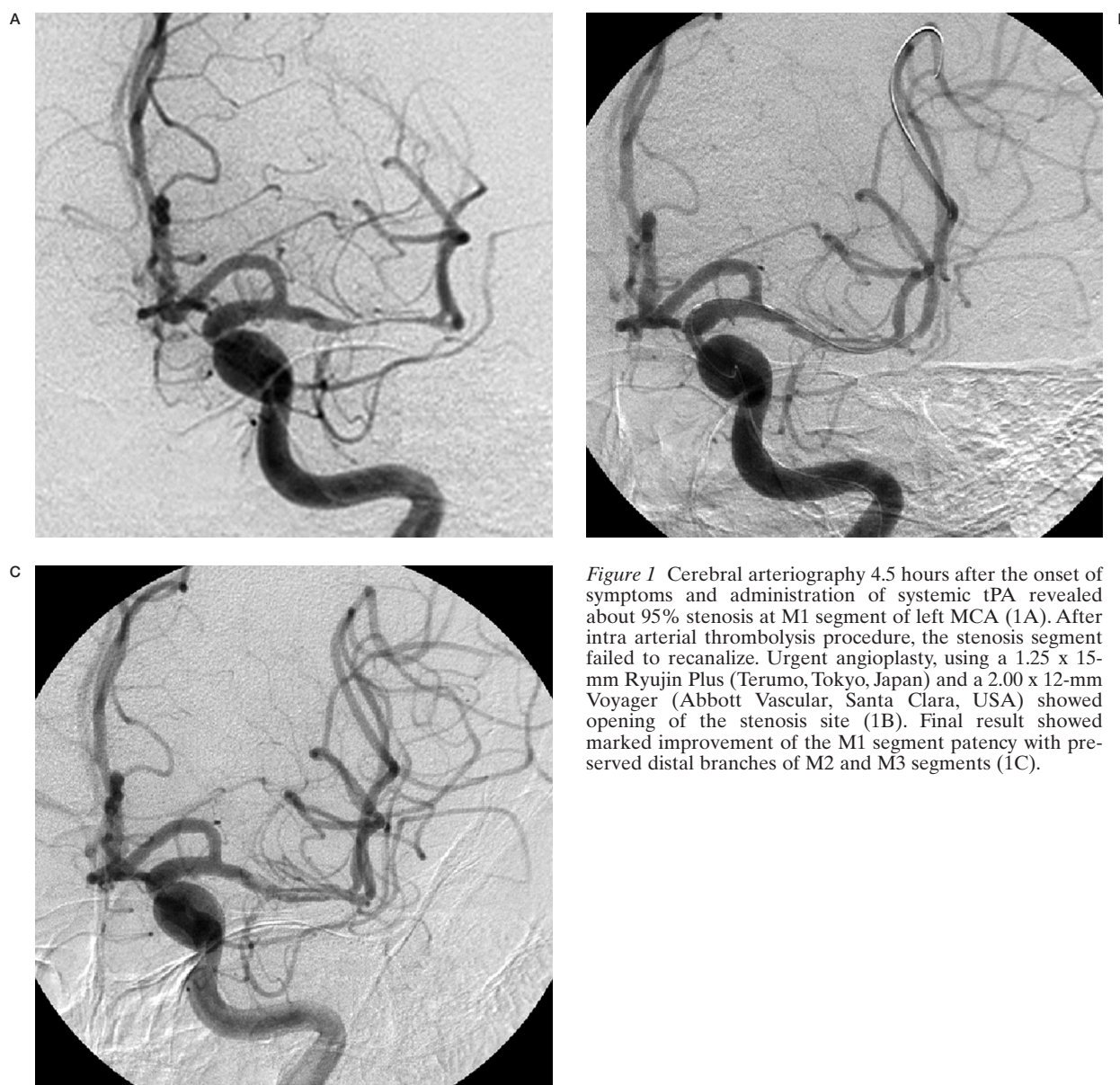


Figure 1 Cerebral arteriography 4.5 hours after the onset of symptoms and administration of systemic tPA revealed about 95% stenosis at M1 segment of left MCA (1A). After intra arterial thrombolysis procedure, the stenosis segment failed to recanalize. Urgent angioplasty, using a 1.25 x 15-mm Ryujin Plus (Terumo, Tokyo, Japan) and a 2.00 x 12-mm Voyager (Abbott Vascular, Santa Clara, USA) showed opening of the stenosis site (1B). Final result showed marked improvement of the M1 segment patency with preserved distal branches of M2 and M3 segments (1C).

A 6F guiding catheter was inserted into the left ICA. A microcatheter and Whisper guidewire (Abbott Vascular, Santa Clara, USA) were gently navigated through the M1 stenotic segment. A 0.014-in exchange length floppy wire was introduced through the microcatheter into a distal M3 branch. The microcatheter was removed, and two sequential sessions of balloon angioplasty were performed with a 1.25 x 15-mm Ryujin Plus (Terumo, Tokyo, Japan) and a 2.00 x 12-mm Voyager (Abbott Vascular, Santa Clara, USA) balloon catheter, which were advanced over the 0.014-in microwire to the site

of stenosis (Figure 1B). The final result showed marked improvement of the M1 segment patency with preserved distal branches of the M2 and M3 segments (Figure 1C). A total of 3000 units of intravenous unfractionated heparin was given at interspersed segments during the procedure.

The patient was transferred to the intensive care unit, neurologically stable with an NIHSS score of 10. CT of the head 24 hours after the procedure revealed no evidence of hemorrhage. CT angiography 3 days after the procedure (Figure 2A,B), showed left M1 patency

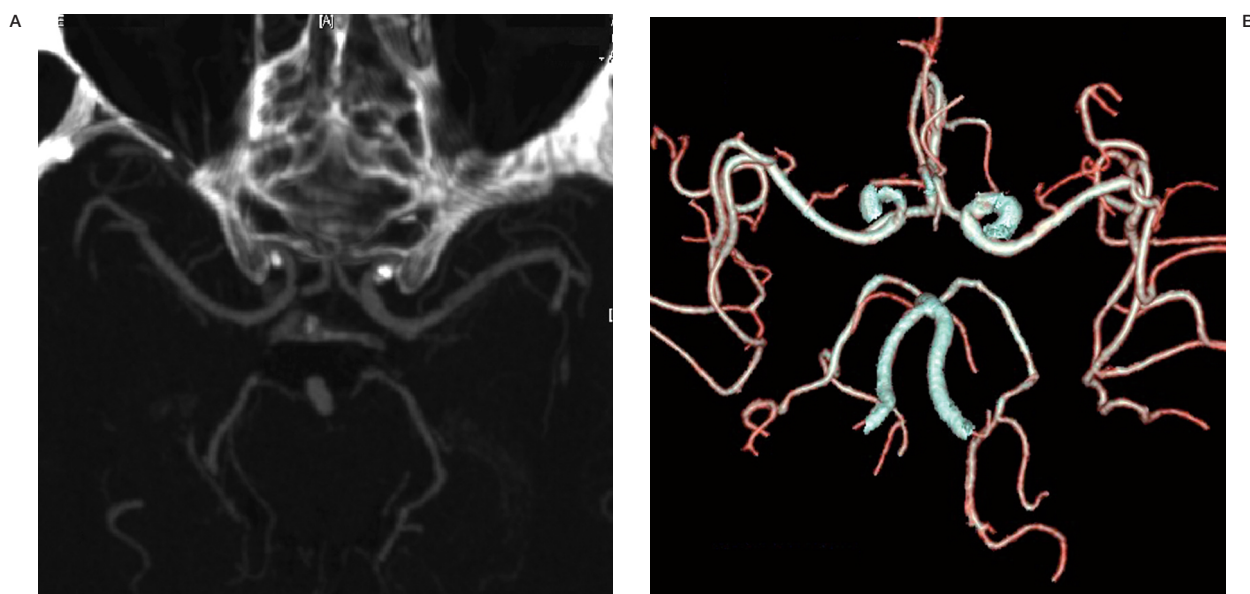


Figure 2 CT Angiography 3 days after procedure (2A,B), showed left M1 patency showing successful recanalization of the disease segment. There was no evidence of hemorrhagic complication.

and successful recanalization of the diseased segment. There was no evidence of hemorrhage.

Discussion

We present the first case of combined intravenous (IV) and intra-arterial (IA) thrombolysis, and angioplasty for treatment of acute stroke in Indonesia. This procedure proved technically feasible despite the lack of resources and equipment; in this case, we had insufficient tPA, and no urokinase. We had to use the only drug available to us at that moment - streptokinase, which has a higher complication rate⁷. We achieved excellent angiographic and clinical results with coordination between the neurologist, the interventional neuroradiologist, and the cardiologist.

It is important to recognize other factors that influenced the favorable results of this case. First, rapid transport of the patient to the hospital was pivotal; the patient arrived only two hours after the onset of symptoms. Once in the hospital, the patient had a rapid and precise diagnosis, and medical treatment by our senior neurologist. It was possible to optimize the thrombolysis procedure first by utilizing the more rapid IV access, and subsequently, by intra-arterial infusion.

Our case also shows that the greatest disadvantages of thrombolytic therapy are the low rate of recanalization and the risk of reocclusion⁵. Angioplasty as an adjuvant or alternative to thrombolytic therapy has been of increasing interest, particularly in patients with MCA trunk occlusion^{4,6,8}. Although distal embolization by small crushed fragments is a noteworthy complication of angioplasty, lysis of these small fragments has been reported to occur readily with IV infusion of small amounts of tissue plasminogen activator (tPA)⁸. Two weeks after treatment, the patient was discharged from the hospital with improvement of his NIHSS score from 14 to 5.

Conclusions

We present a patient with an acute stroke, treated with intracranial angioplasty in the M1 segment of the left MCA after delivery of combined systemic and intra-arterial thrombolysis. We believe this is the first experience in Indonesia of successful arterial recanalization without hemorrhage complications. In addition, this case report suggests an effective alternate protocol for treatment of acute stroke with arterial occlusion: immediate small dose of IV tPA, followed by angiogram, intra-arterial thrombolysis, and angioplasty if indicated.

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